system.

Figure 2.9 Definition of a system The system depicted has input x (t) and output y (t). Mathematically, systems operate on function(s) to produce other function(s). In many ways, systems are like functions, rules that yield a value for the dependent variable (our output signal) for each value of its independent variable (its input signal). The notation y (t)= S (x (t)) corresponds to this block diagram. We term S (·) the input-output relation for the

This notation mimics the mathematical symbology of a function: A system's input is analogous to an independent variable and its output the dependent variable. For the mathematically inclined, a system is a **functional**: a function of a function (signals are functions).

Simple systems can be connected together one system's output becomes another's input to accomplish some overall design. Interconnection topologies can be quite complicated, but usually consist of weaves of three basic interconnection forms.

2.3.6.1 Cascade Interconnection

Cascade

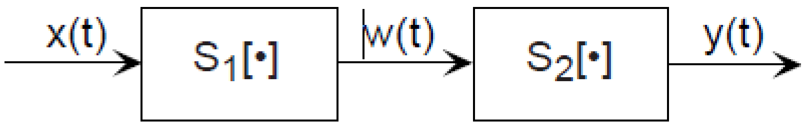

Figure 2.10 Fundamental model of communication The most rudimentary ways of interconnecting systems are shown in the fgures in this section. This is the cascade confguration.

The simplest form is when one system's output is connected only to another's input. Mathematically, *w (t)= S1 (x (t)), and y (t)= S2 (w (t))*, with the information contained in *x (t)* processed by the first, then the second system. In some cases, the ordering of the systems matter, in others it does not. For example, in the fundamental model of communication (Figure 2.10) the ordering most certainly matters.

2.3.7 Parallel Interconnection

parallel